Space Weather Forecast

Issued on Monday, 20 March 2023 at 13:27 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of isolated Moderate-flares throughout. Slight chance of Minor Storm intervals with CME glance possible day 1 or 2 (20th or 21st). Chance of Minor Geomagnetic Storming increasing from late on day 3 (22nd), due to the arrival of a large coronal hole fast wind.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the past 24 hours, with a single moderate flare observed at 20/0147 UTC from a large sunspot in the southeast. This region is the largest and most complex sunspot region currently on the disc. There are five other sunspot regions currently on the visible disc. Generally, these are unipolar and are either stable or showing some decay. However, there has been some slight development of a region near the southeast limb through the period.

No Earth-directed coronal mass ejections (CMEs) have been observed in the last 24 hours.

Solar Wind / Geomagnetic Activity: The solar wind speed was slightly elevated at around 400-470 km/s. The total magnetic field strength was weak with the north-south component also weak and variable. Geomagnetic activity was Quiet to Unsettled (Kp 1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remains just above background levels after the S1/Minor Solar Radiation Storm that occurred last week, however this is still well below the S1/Minor Storm level and is exhibiting a flat trend.

Four-Day Space Weather Forecast Summary

Solar Activity: Low activity is most likely, but with a chance of increasing to Moderate at times with isolated Moderate-flares. These most likely from the regions currently on the southeast disc, or from other regions rotating over the eastern limb over the coming days.

Solar Wind / Geomagnetic Activity: A glancing CME impact is possible day 1 or early day 2 (20th or 21st) from the filament eruption (arc of plasma) from the southwest on 17th March, however this is low confidence. This will come alongside a muted connection to the fast wind from a small coronal hole on day 1 (20th). A stronger fast wind connection is expected either late on day 3 (22nd) or into day 4 (23rd) from a larger and darker coronal hole currently located in the southeast.

Geomagnetic activity is expected to increase to Unsettled with Active intervals day 1 (20th), before easing again day 2 (21st) to become mostly Quiet. Perhaps increasing to Active, with a slight chance of G1/Minor Storm with any CME arrival late on day 1 (20th) and continuing into day 2 (21st). The fast wind arriving from the larger coronal hole will increase geomagnetic activity to Active, with a chance of G1/Minor Storm, with these effects continuing into day 4 (23rd).

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to continue very gradually and erratically declining towards background. No other significant enhancements are currently anticipated with solar Radiation storms not expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	20	30	40
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	25	30	40	40
Very Active	R3 to R5 X	No	1	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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